

**Rio Algom**  
**Rio Tinto**PLEASE REPLY TO Toronto OFFICE

June 24, 1977.

Mr. Ronald W. Daniels,  
Coordinator of Mined Land  
Development,  
State of Utah,  
Department of Natural Resources,  
Division of Oil, Gas & Mining,  
1588 West North Temple,  
Salt Lake City, Utah 84116.

Dear Sir:

Further to our telephone conversation today, I am forwarding to you herewith Rio Algom Corporation's amended MR Form 2. This form will replace the equivalent form which was filed with you previously, together with the Company's Notice of Intention to Commence Mining Operations.

For your convenience, we have indicated by marginal notes the revisions which are included in the enclosed form as compared to the form filed previously. Briefly, the revisions are contained in paragraph (f) on page 5, paragraph (b) and (d) on page 7, and paragraph (a) on page 8.

We trust that the filing of the enclosed MR Form 2 will keep the Company in good standing insofar as the requirements of the Department of Natural Resources, Division of Oil, Gas & Mining are concerned. We intend, of course, to pursue the testing program with outside consultants for the purpose of establishing the best method of dealing with the tailings cover problem. As I indicated to you on the telephone today, we expect the test program to run for approximately one year. When meaningful results have been obtained, you may expect to hear from us further in that regard.

May we hear from you confirming that in the meantime nothing further is required from us by your Department. Particularly, we would ask you to confirm that the matter of security with respect to the reclamation program can be dealt with after your Department has assessed our program. Presumably that will be after our test program has been completed and the program revised accordingly if required.

Yours very truly,

  
J. G. Littlejohn.

JGL/ms

Encl.  
Rio Algom Corporation

P.O. BOX 610 MOAB UTAH 84532 TORONTO OFFICE 120 ADELAIDE STREET WEST TORONTO 1 ONTARIO



No. \_\_\_\_\_

Date \_\_\_\_\_

STATE OF UTAH  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING  
1588 West North Temple  
Salt Lake City, Utah 84116



1. Name of Applicant or Company Rio Algom Corporation
2. Proposed type of operation Underground Mining and Milling of Uranium
3.
  - a) Prior Land Use(s) Sparse Range Land
  - b) Current Land Use(s) Mining Operation
  - c) Possible or Prospective Future Land Use(s) Restricted
4. What vegetation exists on the land proposed to be affected \_\_\_\_\_  
A sparse cover of grasses, forbs and cacti originally covered the area
  - a) Types and Estimated Percent Cover or Density \_\_\_\_\_  
10 - 15% Density
5. What is the range of pH of soil before mining? \_\_\_\_\_ pH.  
Name of Person or Agency and method of determining pH \_\_\_\_\_  
Analyses done by Roy Daughtee, environmental technician. A 50  
gram sample of soil was added to 50 ml of distilled water and  
agitated for 1 hour in a covered container and then the pH was  
read on a calibrated meter.



6. Site elevation above sea level 6800 Feet
7. In case of coal, oil shale, and bituminous sandstone :  
Principal seam(s) and thickness(es) Not Applicable
8. Estimated duration of: mining operations 10 years possible.  
Milling operation for up to 25 years
9. Has overburden, waste or rejected materials been classified as  
acid or alkali producing? ( ) yes ( X ) No  
Tailings area is currently pH 9 - 10  
Does the above material being moved have any other characteristics  
affecting vegetation ? No
10. Will any underground workings or aquifers be encountered? ( ) yes  
( X ) No  
Describe Current mine at 2,500 foot depth is wet to dry. Aquifers  
intersected during shaft sinking are sealed by continuous  
concrete lining in shafts  
Is there an active discharge of water from abandoned deep mines  
on or crossing the land affected? ( ) Yes ( X ) No.  
If Yes, describe the quality of water being discharged. \_\_\_\_\_  
\_\_\_\_\_

11. Describe specifically a detailed procedure for :

a. The mining sequence.

The ore horizon is reached from two vertical concrete-lined shafts some 2,500 feet deep and interconnected by a haulage level driven in waste below the ore. Access to the ore horizon is through inclines from which a rectangular grid system is driven to explore and develop the ore. Extraction of ore-grade material is by continued re-section of the developed blocks of ore, with the material being dumped down boxholes to the haulage level below. Track haulage is used to transport the ore to the main shaft where it is hoisted to surface. The operation, being this far underground, has no effect on the surface.

b. The procedure for constructing and maintaining access roads, to include a typical cross-section and a profile of the proposed road grades.

The access road to the plant site was constructed in 1969 and has been black topped and has been maintained by San Juan County road department. At present it is believed that few additional roads will have to be constructed on the property, in addition to those now in use.

Any roads that may be required in the future will be constructed with a suitable ditch on the up-hill. The road surface will be maintained using local gravel and graded using standard practices required.

c. The procedure for site preparation including removing trees and brush.

Site preparation consisted of removing the sparse brush, levelling and erection of buildings. Scar areas have been either reseeded or have natural growth again.



In most areas where road construction may be required in the future the soil to a depth of several feet is uniform. In general, the soil will be used in the road construction as it is classed as a fine sandy loam. At the time of rehabilitation the material would be re-graded and stabilized. If rock is encountered in road construction, in all probability mine waste would be used to build up the road grade rather than drilling and blasting. The mine waste will gradually disintegrate to a soil not incompatible with that already there.

Only about 30% of the property has a limited cover of scrub pinion pine and juniper. These areas will be avoided as far as practical in any road construction. Where necessary trees will be removed. It should be pointed out that large areas have been cleared of all trees in the neighbourhood to increase growth of edible plants. These trees have practically no commercial value.

- d. The method of removing and stockpiling topsoil or distrubed materials.

Topsoil was conserved and used for fill and landscaping during initial construction. It is not contemplated that it will be necessary to remove and stockpile topsoil in the future for any anticipated construction. If necessary, the past satisfactory practice will be repeated.

Mine waste is currently being stockpiled to the north of the mine in the tailings basin watershed. Some mine waste is also being used to stabilize the dry surface of the tailings area.

- e. The method for the placement or containment of all distrubed materials, to include the method for handling of all acid or alkali-producing and toxic materials.

Mill tailings, after extraction of the uranium are discharged as a slurry in the tailings disposal area in a shallow valley below the plant. Two dams have been constructed across the valley, and the lower impoundment area is currently being used. Temporary stabilization of about 15% of the tailings area is accomplished by the use of mine waste material to minimize blowing. In the near future tailings will be discharged into the upper impoundment area.

There is no liquid effluent discharge from the tailings disposal area. Evaporation and recycle to the mill takes care of all the liquid portion of the tailings discharge. The liquid in the tailings pond currently has a pH of 10.5 to 11.5 and should never become acid.

- f. A procedure for final stabilization of disturbed materials.

When the surface installation is finally abandoned, buildings will be removed and topsoil placed over the building plan area and seeded with natural and native grasses.

The tailings are being discharged so as to minimize any final pond area. As soon as practical after the tailings areas are finished with and they dry out, they will be graded to eliminate any remaining pond, and covered with the available mine waste.

The mine waste is mainly Cutler formation composed of medium-grained sandstone with some fine grained siltstone. The fine material will fill the voids between the coarser pieces and with compaction should form a fairly impervious layer about 1-1/2 feet thick over the tailings.

Subject to the findings of a study that is to be made of radon emanation rates and permeability rate for various local soils, it is tentatively proposed to place one foot of compacted local clay material over the mine waste rock. This material will be similar to that used in the core of the two local tailings dams. On top of this will be placed an additional 4-1/2 to 5 feet of compacted local soil for a total cover of about seven feet. The cover material will then be seeded to provide a vegetation cover. Based on the study that is to be started this summer, the above cover thickness will be varied to meet the NRC requirements.



GRADING AND REGRADING

Specifically describe :

a. Typical cross-section of regrading.

The attached Lisbon Tailings Areas plan indicates the present conceptual plan for the finished surface drainage of the two tailings areas.

As all tailings is deposited as a slurry behind watertight embankments, the surface contours are essentially graded and could require minimal regrading at shutdown.

Each area will have a continuous finished surface slope to the south. Any improbable surface run-off would be allowed to pass over the south end of the dam. The diversion ditch to the south of the dams would be capable of handling the small watershed run-off from a 100 year storm without entering the tailings area.

b. The method of spreading topsoil or upper horizon material on the regraded area and indicate the approximate thickness of the final surfacing material.

While the ponds in the two tailings areas are drying up before and after mill operations have ceased the surface of both areas will be graded if necessary to a continuous slope to preclude the ponding of any water.

During this period, mine waste from the storage area will be brought in to cover the less stable portions of the former ponds. This will be spread by dozer or dragline or other equivalent equipment.

Revised 24 June 1977

In all cases sufficient inert material will be used over all tailings to maintain the gamma readings at a distance of 3 feet at less than 170 mR/hour. This requirement is expected to be met by between 6 inches and a foot of soil and/or rock material. Thus the proposed seven feet of cover will reduce the gamma radiation to very low levels.

Some topsoil will be placed on top of the soil cover over the tailings to assist natural grass and shrub growth. To become established and minimize wind and water erosion on the gentle surface slopes.

- c. What type of soil treatment will be utilized.

By letter of 1 September 1971 the district manager of the BLM at Monticello recommended a mixture of grasses suitable for revegetation in this area. At the time that the tailings area is to be stabilized soil samples will be obtained and analyzed to determine the fertilizer requirements. The BLM will again be contacted to determine whether their recommendations for seeding are still valid. The local topsoil has been sampled by University of Utah and requires no treatment. The above grasses are already doing well where they have been used on the dam faces.

- d. The method of drainage control for the final regraded area.

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Due to the location of the tailings area, there is practically no watershed aspect to be considered to decrease the amount of water than can get into the tailings area a 5000 foot diversion ditch has already been constructed so all uncontaminated run-off water will by-pass the plant and tailings area and flow down West Cayote Wash.

- e. Maximum grading slope.

The maximum grading slope will be on the downstream face of the dam walls at a grade of 1 in 3 for the upper dam and 1 in 2.5 on the lower dam. A uniform slope of about 2% will be maintained across the finished surface of the tailings cover to ensure a minimum of erosion and no ponding.



TESTING

1. a. Describe method for testing stability of reclamation fill material.

The tailings dams were constructed under competent supervision and approved by the Utah State Engineers on completion.

The initial cover of material over the tailings will be mine waste from the waste storage area. This material is composed of a mixture of Cutler medium-grained and maroon sandstone with a few narrow bands of fine grained siltstone. It is considered that this is a stable material for placing over the gentle tailings slopes. Because the waste is from development headings, it is comparative finely broken and with weathering there will be more than sufficient fine material to fill the interstices between the larger pieces or rock. It is estimated that there will be sufficient mine waste to provide about 1½ feet of cover. The coarse material in this mine waste should improve the stability of the layer if exposed to wind or water erosion.

Over the mine waste will be placed a minimum of one foot of clay as available on site, similar to that used in the core of the tailings dams. This material also should be stable on the gentle tailings slopes.

The above two layers will be topped with local soil as used in the construction of the tailings dams. As exposed on the much steeper face of the dams the soil has shown no measurable erosion over the past 5 years. This material will be added to give a minimum thickness of 7 feet total.

As is evident from the face of the two tailings dams, the local soil is satisfactory for supporting vegetation. The whole area will then be seeded on completion using a seed mixture as recommended by the BLM.

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- b. Describe method for the testing of soil that is intended to support vegetation.

Topsoils intended to support vegetation were sampled by the University of Utah and have already been proven satisfactory by the growth of natural vegetation.

2. Describe any soil treatment employed as an aid to vegetation.

It is not anticipated that any soil treatment will be required. The existing growth bears this out.

3. Describe surface preparation of areas intended to support vegetation.

It has been proven that none is required. If necessary, at the most appropriate time of year for seeding the seed mixture will be spread in the recommended quantities.

## REVEGETATION

1. Revegetation to be completed by :

( X ) Operator  
( ) Soil Conservation District  
( ) Private Contractor \_\_\_\_\_  
\_\_\_\_\_  
(Name)  
( ) Other (Specify)

( ) Hydroseeding  
( ) Aerial Seeding  
(X) Conventional or Range-  
land Drilling  
( ) Other (Specify)

2. Will Mulch be used?

Type	No
------	----

Rate/Acre	lbs.
100	100
200	200
300	300
400	400
500	500
600	600
700	700
800	800
900	900
1000	1000
1100	1100
1200	1200
1300	1300
1400	1400
1500	1500
1600	1600
1700	1700
1800	1800
1900	1900
2000	2000
2100	2100
2200	2200
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3600	3600
3700	3700
3800	3800
3900	3900
4000	4000
4100	4100
4200	4200
4300	4300
4400	4400
4500	4500
4600	4600
4700	4700
4800	4800
4900	4900
5000	5000
5100	5100
5200	5200
5300	5300
5400	5400
5500	5500
5600	5600
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6200	6200
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7000	7000
7100	7100
7200	7200
7300	7300
7400	7400
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8200	8200
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9100	9100
9200	9200
9300	9300
9400	9400
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9600	9600
9700	9700
9800	9800
9900	9900
10000	10000



3. Revegetation Plan and Schedule -

Species	Rate/ Acre	Planting Location	Facing N-S-E-W	Season to be Replanted
Mixture of Crested Wheat Intermediate Wheatgrass Alfalfa Yellow Sweet Clover	20 lbs	Embarkments and covered areas	Mainly West	Self propagating

4. Will affected area be subject to livestock or wildlife grazing:  
( ) Yes ( X ) No Will vegetation protection be needed?  
Whole area is already fenced to preclude people and stock.
5. Will irrigation be used? ( ) Yes ( X ) No Type \_\_\_\_\_
6. Describe maintenance procedure for revegetation if needed, until  
surety release is granted Annual inspection and spot re-seeding  
as needed. Experience has shown that grasses are self re-seeding.

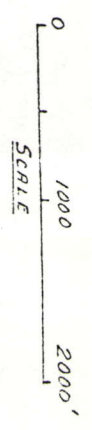
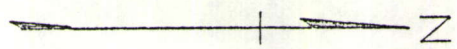
I, the undersigned Operator, hereby submit this to be my Reclamation and Mining plan for the area shown on the attached map. I further understand that the operation will be conducted in accordance with the Mined Land Reclamation Act of 1975, and all rules and regulations currently in effect thereunder.

Signed \_\_\_\_\_, Operator, Date \_\_\_\_\_

Taken, subscribed and sworn to before the undersigned authority in my said county, this \_\_\_\_\_ day of \_\_\_\_\_, 197\_\_\_\_.

Notary Public \_\_\_\_\_

My Commission Expires \_\_\_\_\_

[illegible]